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**US Army Corps
of Engineers®**

Engineer Research and
Development Center

Coastal Inlets Research Program

Description

The Coastal Inlets Research Program (CIRP) is a R&D Program funded through the Operations & Maintenance (O&M) funding. The CIRP mission is to develop tools and methodologies to reduce O&M costs at coastal navigation projects, including inlets, entrances, ports, navigation structures, channels, and adjacent beaches. PC- and web-based products are provided for District engineers and scientists to rapidly evaluate O&M alternatives.

Issue Addressed

The Corps has a limited O&M budget with which to operate and maintain more than 1000 coastal navigation projects that cover 13,000 miles of coastal navigation channels. Coastal inlet navigation channels must be maintained in a complex environment of waves, tidal and wave-induced currents, sediment transport, and vessel-induced flow and wake. In FY 2012, the Corps spent approximately \$860 million in maintenance dredging of 216 million cubic yards from Federal navigation channels. Dredging costs are likely to increase in the future because of increasing fuel, mobilization, and demobilization prices. Additionally, to remain competitive, harbors and ports must deepen and widen navigation channels to accommodate larger vessels; however, deeper and wider channels are more efficient sediment traps, therefore increasing shoaling and O&M costs. Modifications to coastal inlet channels and jetties can have a profound effect on the integrity of the navigation structures, adjacent beaches, estuaries, ecosystems and regions. Demand for regional sediment management practices and mitigation for engineering activities includes innovative creation of nearshore berms with dredged sediment intended as a source to nourish neighboring beaches. Renewable, cost-effective placement sites for dredging must also be designed such that sand moves onshore, fine sediments are dispersed offshore, and re-deposition into the navigation channel is minimized. Such



Figure 1. Coastal navigation channels are vital commercial and military navigation links that are connected to beach stability, estuary health, and economic strength of local & regional communities.

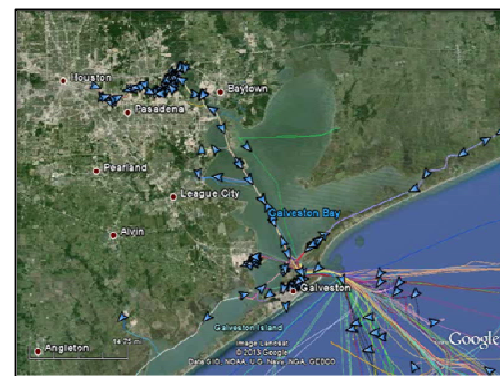


Figure 2. Automated Information System (AIS) data reported by the CIRP's AIS Analysis Package (AISAP) for vessel movement in vicinity of Houston-Galveston navigation channel, Texas.

projects require characterization of hydrodynamics, wave forcing, sediment transport, and morphology change, as well as geomorphologic approaches. Thus, navigation project O&M, structure integrity and implications of ongoing and future dredging actions must be considered within a sediment-sharing inlet system.

Products

CIRP products include the Coastal Modeling System (CMS), a PC-based, integrated wave-current-sediment transport-morphology change numerical model available within the Surface-Water Modeling System (SMS); GenCade, a one-line shoreline change and sand transport model for use in regional studies including sand sharing at inlet systems; the Channel Portfolio Tool (CPT), a web-based application for analyzing commercial utilization of the USACE-maintained waterway infrastructure (dredged channels, coastal structures, inland navigation locks) at a variety of coverage levels; the Automated Information System Analysis Package (AISAP), a web-based access to US Coast Guard vessel transit data; and a range of other PC- and web-based tools and applications.

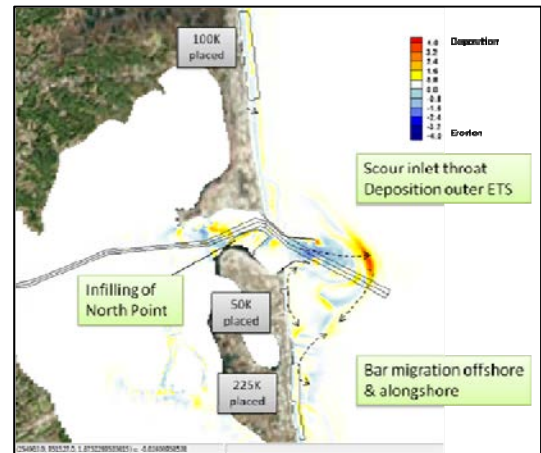
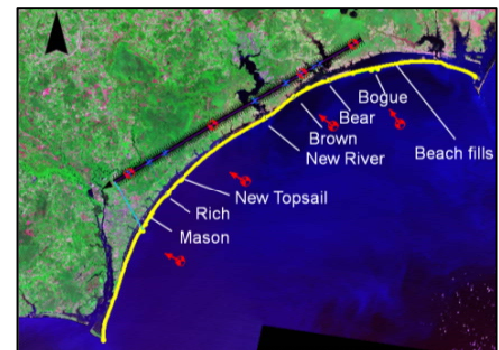


Figure 3. Evaluation of 6-month morphologic change after sediment mining and placement at Newburyport, Massachusetts, as calculated by the Coastal Modeling System (CMS).

Projected Benefits

The CIRP's applied research and development provides quantitative and practical predictive tools and data to reduce the cost of dredging for Federal navigation projects, maintain jetties, identify potential unintended consequences, mitigate for engineering activities related to navigation channels, prioritize maintenance options within budget constraints, and support national security to protect waterways and ports.



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Accessing CIRP Products and Documentation

The CIRP website has additional information on CIRP tools and documentation:
<http://www.erdc.usace.army.mil/Missions/WaterResources/CIRP/Publications.aspx>

CIRP webinars have been archived here:
<http://www.erdc.usace.army.mil/Missions/WaterResources/CIRP/TechTransfer.aspx>

CIRP guidance is documented on the CIRP wiki: http://cirpwiki.info/wiki/Main_Page.

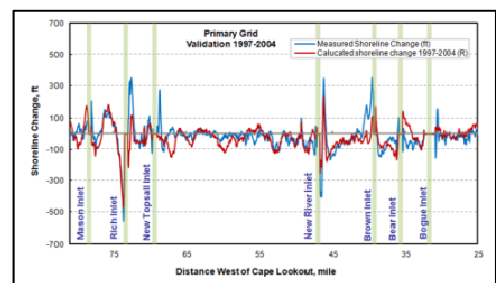


Figure 4. GenCade applied to evaluate sand management alternatives, Onslow Bay, NC